

Pathfinder: Sierra Energy heads for a world beyond garbage, traditional power, fuel

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A commercially feasible technology for converting municipal waste into useful power and fuel comes closer, closer.

This past season, the fifth-generation Nissan Pathfinder CUV has been starring in a commercial titled “Follow Me,” in which a vacationing family (in their all-new Pathfinder) reaches a closed winter road, only to be led (via truck, snowmobile, hang glider and sled dogs) on an epic detour through snow and mountain country, to the awesome vistas of “Glacier Peak” they had been seeking.

One of these days, someone might make a commercial in which the protagonists find a detour around some methane-reeking Mt. Garbage, crowning peak in a range of towering landfill mountains. In the foreground, impassable mountains of garbage. With the help of technologists, the landfill heap is reduced to a small, harmless residue — and our trapped tourists then go on their way, immovable object having been eliminated.

You might find that Sierra Energy’s FastOx Pathfinder system is called upon to do the job.

The power equation

What is it, exactly, the Sierra Energy FastOx Pathfinder technology? Think “teensy blast furnace”. With some modifications.

In terms of the power value, you have something like the potential to make 500 pounds of syngas from the annual US household garbage pail, roughly enough to run a 12 KW generator. That wouldn’t exactly power an electricity-hungry Western lifestyle, but it’s enough to keep the lights, heat, AC, fridge, freezer and sump pump running in a 1500 ft home. And no 2 gallons of diesel fuel per hour to run the generator.

Now, you’re not going to see household-size conversion systems any time soon on the horizon on a cost feasible basis, but Sierra’s Pathfinder system appears to be making some waves with a skid-mounted, 10 ton-per-day system that it originally developed as a small demo unit to prove the viability of its technology.

Only to find that prospective clients keep saying, “I’ll take that one,” pointing to the 10 TPD demonstration unit.

Potential customers for small-scale systems? US Navy aircraft carriers and destroyers; cruise ships, cargo ships, ferries; small, isolated communities; FEMA (for disaster relief).

“The DoD has been looking for small scale,” said Sierra Energy CEO Mike Hart in speaking with the Digest. “They’ve been funding development of our system — they’ve got 500+ installations around the world and a number of them have severe energy security and disposal challenges.” Making the economics work for a small system just on power-gen is tough, says Hart.

“Electricity is the least valuable thing you can make. But there are lots of customers, it turns out, that are looking for small systems to start off. In some cases, they want a distributed solution, where they can place units around a city and generate 500 KW in each location. Until you have a working small scale system working in the community, there’s always going to opposition to “new”.

“A small, successful system in any community,” Hart adds, “is a huge step forward that allows people to see zero waste, and emissions well below running a nat gas plant. When they see it works, people want to make the next move up.”

Beyond power, what can you do with syngas to make it more valuable for customers?

“You can make ethanol,” said Hart, “but there are so many politics baked into that fuel that I just avoid it. We’ve tested our system, working with Velocys, and their small scale system can make 1 barrel of diesel per ton of waste.” He chuckles. “But that’s an awfully small refinery, to work off a 10 ton per-day system.”

“The market I find the most interesting, especially here in California, is renewable hydrogen. I understand the hesitation around the vehicles, but part of the reason that hydrogen fuel-cell vehicles haven’t taken off is that hydrogen sells \$6/kg in the best set of subsidized circumstances, and the reality for many people is \$10-\$12 per kilogram.”

Now, fuel-cell vehicles under development by Honda and Toyota can hold roughly 5 kilos of hydrogen and they get a range of around 300 miles. So, you can do the math at \$10-\$12 per kilo, and rapidly you get to a cost of \$0.16 – \$0.20 per mile. Compare that to a Toyota Camry (roughly same size) getting 300 miles on roughly 12 gallons of gasoline, costing \$0.14 per mile even at \$3.50 per gallon.

And you gotta pay \$50,000 for what is, essentially, a \$23,000 Camry. And you have to fill up at one of something like 100 stations around the country that cost \$1 million each. (As opposed to an ethanol blender pump costing \$50,000).

But renewable hydrogen, says Hart, offers radically different economics.

“We can take a ton of MSW and get 98 kilograms of renewable hydrogen at a cost of \$0.50 per KG. It’s a game changer compared to using black hydrogen, which is sold at a high-price and trucked to expensively-built stations. Our technology offers a massively distributed option, well below the competitive cost of gasoline. Since one kilo of hydrogen gives you about as much range as two gallons of gasoline, it’s like the equivalent of \$0.25 per gallon of gasoline.”

How does the distribution work, exactly?

“You’d integrate the fueling station with the gasification,” says Hart. “Transporting hydrogen is expensive, but most towns have transfer stations where they consolidate garbage before moving it to regional landfills. At a transfer station or MRF, you put one of the small scale portable gasifiers there and set it up as a station. It’s not as convenient as a gas station on every corner, but early adopters are used to inconveniences. Look at how far people drive to use the Tesla rapid power stations, when there’s like one per state.

“If even just a city converted over to fuel-cell vehicles, or some other fleets, you could start making the transition without some giant government subsidy, and with \$0.25 per gallon fuel you can make the economics work.”

How does Sierra Energy play in the market — more importantly, foster such a market?

“We’re a technology licensor, so we’re not going to be building stations ourselves. But we have an important role to play, because our focus is to get the pathfinder gasifier cost down to 1/3 of where it is now, by building up the demand. We want to drive the cost down to a fraction – as low cost as we can go. That’s what the market needs, that’s what we’re driving at.